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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/040,061	01/04/2002	Tsann Lin	SJO920000145US1	9391
7590	10/20/2003			
Brian C. Kunzler 10 West 100 South Salt Lake City, UT 84101			EXAMINER KOPPIKAR, VIVEK D	
			ART UNIT 1775	PAPER NUMBER 5

DATE MAILED: 10/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/040,061

Applicant(s)

LIN ET AL.

Examiner

Vivek D Koppikar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 21-28 is/are rejected.
- 7) ☒ Claim(s) 19 and 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

**FINAL OFFICE ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-8, 10, 14-18, 21, 23, 25, and 27-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent Number 11-175919 (hereafter referred to as JP'919).

With regard to Claims 1, 14 and 27, JP'919 teaches a magnetoresistive head (spin valve sensor) which consists of a sensing layer (11) and a reference layer (13). A spacer layer (12), made of nonferromagnetic material is interposed between the two layers (11 and 13) which are both made of ferromagnetic material. An antiferromagnetic film (AFM film) (14) is adjacent the reference layer (13). The AFM film consists of two films which are both made of alloys of Mn (including Ni and Pt) (Translated Abstract and Figure 1).

With regard to Claims 2 and 15, one of the AFM films in JP'919 (15) is in contact with the reference layer while the other one is not (16) (Translated Abstract and Figure 1).

With regard to Claims 3-7 and 16-18, the first AFM film (15) in JP'919 has an Mn content of between 40 to 60% while the second AFM film has an Mn content of between 50 to 95%. In at least one embodiment, the first AFM film could have an Mn content of 60% while the second AFM film has a content of 50% (Translated Abstract).

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With regard to Claims 8, 10, 21, 23 and 25, the first AFM film has a thickness of between 10 to 50 angstroms while the second AFM film has a thickness of between 30 to 100 angstroms (Translated Abstract).

With regard to Claim 28, the magnetic medium of JP'919 is used in a magnetic disc unit.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 9, 11-13, 22, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'919 as applied to Claims 2 and 15 above respectively and in further view of US Patent Number 6,493,196 to Noma.

With regard to Claims 9, 11-13, 22, 24 and 26, in JP'919 the two antiferromagnetic layers are both less than 100 angstroms.

Noma teaches making antiferromagnetic films greater than 100 angstroms in order to prevent the exchange coupling magnetic field for the fixing orientation of magnetization of the pinned magnetic layer (or AFM layers) from deteriorating or not working (Col. 3, Ln. 16-23).

At the time of the invention, one of ordinary skill in the art would have made the thickness of the AFM layers in JP'919 above 100 angstroms to prevent the deterioration of the magnetic field of the AFM (pinned layer) as recited in Noma.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Number 6,515, 838 to Gill in view of JP'919.

Gill teaches a disk drive system which comprises a spin valve sensor along with an actuator for moving the spin valve sensor across the magnetic recording disk as well as detector electrically coupled to the spin valve sensor for detecting changes in resistance caused by the spin valve sensor (Col. 4, Ln. 66- Col. 5, Ln. 11).

The spin valve sensor in Gill does not include two AFM films.

JP'919 teaches a magnetoresistive head (spin valve sensor) which consists of a sensing layer (11) and a reference layer (13). A spacer layer (12), made of nonferromagnetic material is interposed between the two layers (11 and 13) which are both made of ferromagnetic material. An antiferromagnetic film (AFM film) (14) is adjacent the reference layer (13). The AFM film consists of two films which are both made of alloys of Mn (including Ni and Pt) (Translated Abstract and Figure 1). The antiferromagnetic film of JP'919 exhibits a strong exchanging and combining magnetic field.

At the time of the invention, one of ordinary skill in the art would have been motivated to the spin valve with the AFM film as taught in JP'919 with the expectation of obtaining a disk drive with a strong exchanging and combining magnetic field as recited in JP'919 (Translated Abstract).

### ***Response to Arguments***

6. Applicant's arguments filed on August 11, 2003 have been fully considered but they are not persuasive.

Applicants argue that JP'919 fails to teach or disclose pinning layers comprised of at least two AFM films each selected from the same Mn-based alloy system, in particular, a two element alloy system such as Ni-Mn and Pt-Mn.

The examiner would like to point out that even though JP'919 does not require the two AFM layers to be of the same Mn-based alloy system JP'919 certainly does not exclude the possibility that both AFM layers are of the same Mn-based alloy system. Specifically, JP'919 states that the Mn alloy of the first anti-ferromagnetic layer includes one or more elements selected from the group of Pt, Ni, Rh, Au and Pd while the Mn alloy of the second anti-ferromagnetic layer includes one or more elements selected from the group of Pt, Ni, Ir, Rh, Ru, Co, Fe and Pd (Translated Claims 2 and 3). This includes the embodiment wherein the first AFM layer consists of either Ni-Mn or Pt-Mn while the second AFM layer consists also of either Ni-Mn or Pt-Mn. In other words both the first and the second AFM layers are made of the same, two-element alloy in one embodiment of JP'919 which is the same as in the instant invention.

Applicants claim that in JP'919 the Mn alloy systems used for the first and second layer AFM layers include at least three elements. However the applicants are directed to the Translation of the Claims, a copy of which was included in the previous Office Action. Claims 2 and 3 state that the Mn alloy systems used in the first and second AFM layers contain "at least one or more sorts" of elements selected from the recited group. The examiner interprets this phrase to include one more element in addition to Mn for a total of two elements in the Mn alloy. Furthermore, according to claims 2 and 3, this includes a Ni-Mn alloy or a Pt-Mn alloy.

***Allowable Subject Matter***

7. Claims 19-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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The following is a statement of reasons for the indication of allowable subject matter:

In JP'919 the second antiferromagnetic film has an Mn content of at least 50% or greater. US Patent Number 6,495,275 to Kamiguchi teaches an MnPt alloy used in an antiferromagnetic film which has an Mn content of less than 50% however there is no motivation to modify JP'919 to use an antiferromagnetic film with an Mn content of less than 50%.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

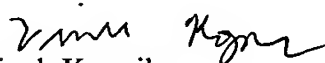
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Vivek Koppikar** whose telephone number is **(703) 305-6618**. The examiner can normally be reached on Monday-Friday from 8 AM to 5 PM, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones, can be reached at (703) 308-3822. The fax phone numbers for the organization where this application or proceeding are assigned are (703) 305-7718 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

  
Vivek Koppikar

10/16/03

  
DEBORAH JONES  
SUPERVISORY PATENT EXAMINER